

10/589058

AP20 Rec'd PCT/PTO 11 AUG 2006

[10191/4383]

DIRECT PLUG-IN CONNECTION INCLUDING A CABLE END SLEEVE

The present invention relates to a removable electrical plug-in connection made up of a connector and a mating connector; the mating connector includes a p.c. board and has at least one contact area which is connectable at least in part to the 5 connector.

Background Information

Plug-in connections in varied designs are known. As a rule, 10 they are made up of a connector, e.g., a plug, which is insertable into a mating connector, e.g., a socket, in order to establish a removable electrical plug-in connection. Both connectors are connected to cables. With its outside diameter, the connector is in contact, at least in part, with 15 the inside diameter of a socket of a mating connector, thereby establishing an electrical contact.

Other mating connector designs have p.c. boards on which switching elements are situated. In addition, these p.c. 20 boards also have contact areas into which connectors are insertable. As a rule, these contact areas are sockets which are situated directly on the p.c. board.

Disadvantages of the Related Art

25 The above-described design according to the related art has the disadvantage that this is not a reliable electrical connection which is able to withstand fretting corrosion. Micro-movements between the contacts and great insertion 30 forces, which are necessary to prevent unintentional

EV839763495

loosening, cause, in multipole plug-in connections in particular, this type of corrosion which has an adverse effect on the quality of the electrical plug-in connection.

Furthermore, only expensive and, in technical terms, complex approaches for contacts are known, which meet the high technical demands such as current transfer, insertion cycles, shaking, etc.

Object of the Invention

10

The object of the present invention is to propose a reliable electrical and removable plug-in connection in which a connector is contactable with a mating connector and in which the mating connector has a contact element, e.g., in the form 15 of a board, p.c. board, or similar.

Achievement of the Object

The object is achieved by the features of Claim 1.

20

Advantages of the Invention

One of the advantages of the present invention is that the proposed connecting technology is very space-saving and finds 25 sufficient space in a housing of a connector. In addition, the connection may be securely established, so that an electrical plug-in connection is ensured in any type of combination of connector and mating connector.

30 Furthermore, it is an advantage that an electrical connection may be established directly so that the pins or male connectors of an electrical plug-in connection, customary per

se, are no longer necessary. Pins or male connectors may be avoided in this way. In addition, this type of design of an electrical plug-in connection may be very easily used in sensors, valves, or similar components in which a removable 5 electrical plug-in connection is to be implemented, but in which the necessary installation space for this is extremely limited.

Further advantageous embodiments arise from the subsequent 10 description as well as from the claims.

Drawing

15 Figure 1 shows a perspective view of the mating connector according to the present invention including partially shown contact elements;

20 Figure 2 shows a perspective view of an exemplary embodiment of a contact element.

Detailed Description of the Exemplary Embodiments

Figure 1 shows a mating connector 1 in section. It is made up of a housing 2 as well as a contact element 3 situated in the 25 housing, contact element 3 being a p.c. board in this exemplary embodiment. Connector 12 is made up of a contact carrier 11, contact element 6 and clamping elements 4 which are situated on both sides of contact elements 6. Contact carrier 11 additionally has apertures 5, through which contact 30 elements 6 are insertable. Connector 12 may include a plurality of contact elements 6 shown here (multi-pole plug connector).

In contact position, as it is shown in Figure 1, contact elements 6 end in contact area 7 of contact element 3. The ends of the contact element 6 are designed in such a way that 5 they are in contact on both sides of contact element 3 in its longitudinal extension, thereby establishing an electrical connection between contact element 6 and contact element 3 of mating connector 1. For fixing contact elements 6 on contact element 3, clamping elements 4 of contact carrier 11 are 10 provided which, in the exemplary embodiment shown here, grip around the ends of contact element 6, at least partially, and press contact element 6 against contact areas 7 of contact element 3.

15 The clamping effect of clamping elements 4 may be created in different ways:

First, there is the possibility that clamping elements 4 are displaceably positioned elements which effect fixing of 20 contact elements 6 either by joining contact carrier 11 or by using actuators, which are not shown in the drawing in greater detail.

Second, there is the possibility that clamping elements 4 have 25 latching elements, into which contact elements 6 latch in their contact position (as shown in the drawing).

In order to create an optimized contact possibility between contact element 3 and contact element 6, provision is made to 30 use contact element 6 including a sleeve 8 as it is shown in Figure 2. This sleeve 8 is made of an electrically conductive material which is slid over the contact area of contact

element 6. Beads 10 are provided on outer surface 9 of sleeve 8 which create defined contact points with contact element 3 in contact area 7. As an alternative, sleeve 8 is also fixable via an at least partially insulated end of a cable, 5 thereby creating a connector in a simple manner. This creates the possibility of omitting male connectors and pins and avoiding complex connecting methods between the male connectors or pins and the cable end.